



US 20170208382A1

(19) **United States**(12) **Patent Application Publication**
Grinker(10) **Pub. No.: US 2017/0208382 A1**(43) **Pub. Date: Jul. 20, 2017**(54) **IN-EAR SPEAKER HYBRID AUDIO
TRANSPARENCY SYSTEM***1/1083* (2013.01); *H04R 3/04* (2013.01);
H04R 2460/11 (2013.01)(71) Applicant: **Apple Inc.**, Cupertino, CA (US)(72) Inventor: **Scott C. Grinker**, Cupertino, CA (US)(21) Appl. No.: **15/000,994**(22) Filed: **Jan. 19, 2016****Publication Classification**(51) **Int. Cl.****H04R 1/10** (2006.01)**H04R 3/04** (2006.01)**G10K 11/178** (2006.01)(52) **U.S. Cl.**CPC **H04R 1/1041** (2013.01); **G10K 11/1782**
(2013.01); **H04R 1/1016** (2013.01); **H04R**

(57)

ABSTRACT

A user content audio signal is converted into sound that is delivered into an ear canal of a wearer of an in-ear speaker, while the in-ear speaker is sealing off the ear canal against ambient sound leakage. An acoustic or venting valve in the in-ear speaker is automatically signaled to open, so that sound inside the ear canal is allowed to travel out into an ambient environment through the valve, while activating conversion of an ambient content audio signal into sound for delivery into the ear canal. Both user content and ambient content are heard by the wearer. The ambient content audio signal is digitally processed so that certain frequency components have been gain adjusted, based on an equalization profile, so as to compensate for some of the insertion loss that is due to the in-ear speaker blocking the ear canal. Other embodiments are also described and claimed.

